

### REMARKS

This communication is in response to the Office Action mailed February 15, 2007. In the Office Action, claims 1-9 and 11-36 were pending.

### REJECTIONS UNDER 35 U.S.C. §101

The Office Action reports that claims 1-9 and 11-36 were rejected under 35 U.S.C. §101 for being directed to nonstatutory subject matter. Applicants ask for reconsideration of applicable law for this rejection. Claims 1, 22, 27 and 36 provide modified classifiers for labeling data. More particularly, claim 22 and 27 label textual data to ascertain a meaning. In the Office Action, it appears that this language was ignored and only “the classification of data” is addressed as being an abstract concept. In addition, Applicants have amended dependent claim 26 and added new claim 38 to specifically address comments in the Office Action relating to a practical application.

The Office Action includes a discussion of how abstract ideas do not satisfy the subject matter requirements of 35 U.S.C. 101 as a matter of law. However, the applicants submit that this discussion is misapplied as a matter of fact as to the present claims, because the present claims are directed to useful, concrete, and tangible subject matter which manifestly satisfies the subject matter requirement of §101. The applicants submit that a proper analysis will show that the present claims likewise “fall comfortably within the broad scope of patentable subject matter under §101.”

### 1. THE LAW OF PATENTABLE SUBJECT MATTER

§101 extends the offer of patent protection to “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof”. As Congress commented in passing the statute, it was intended to cover “anything under the sun that was made by man”, and the Supreme Court and the Court of Appeals for the Federal Circuit have both reiterated that observation, along with noting that the repeated usage of the word “any” applied to expansive descriptions of subject matter, were intended to emphasize that no restrictions were to be placed on patentable subject matter other than those specifically recited in §101. (S. Rep. No. 1979, 82d Congress, 2d Sess., 5 (1952); *Diamond v. Chakrabarty*, 447 U.S.

303, 206 USPQ 193 (1980); *State Street Bank & Trust v. Signature Financial Group*, 47 USPQ2d 1596, 1600 (Fed. Cir. 1998) (Rich, J.).)

What restrictions on patentable subject matter that are specifically recited in §101 are a broad set of categories of subject matter, a requirement that the subject matter be new, and a requirement that the subject matter be useful. Of the category restrictions, the term “process” is specifically interpreted in 35 U.S.C. 100(b) to mean “process, art, or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material”; and the term “manufacture” was specifically interpreted by the U.S. Supreme Court in *Chakrabarty* according to a dictionary definition of “the production of articles for use from raw materials prepared by giving to these materials new forms, qualities, properties, or combinations whether by hand labor or by machinery”. The Court of Appeals for the Federal Circuit has also emphasized that applicability of claimed subject matter into any one of the four named categories is the relevant issue, as opposed to distinguishing which of the categories the subject matter is directed to. *State Street Bank* at 1602.

The requirement that the subject matter be new is treated according to a detailed statutory scheme in the two sections following §101, covering novelty and non-obviousness, while the question of usefulness is not treated further in the statute. The courts have accordingly required no more than a minimal showing of utility to satisfy this requirement: “The threshold of utility is not high; An invention is ‘useful’ under section 101 if it is capable of providing some identifiable benefit... To violate §101 the claimed device must be totally incapable of achieving a useful result... [the] test for utility is whether invention ‘is capable of serving any beneficial end’.” *Juicy Whip Inc. v. Orange Bang Inc.*, 51 USPQ2d 1700, 1702 (Fed. Cir. 1999)(citations omitted). In *Juicy Whip*, the Court of Appeals for the Federal Circuit held that a patent directed solely to altering the appearance of a product to increase sales, satisfied the required showing of usefulness under §101, and held that the district court had erred in holding otherwise.

This is in accord with the crucial metric enunciated in *State Street Bank* – that the claimed subject matter produce a “useful, concrete, and tangible result”. *State Street Bank* at 1373-74. Therefore, while the requirement of being “new” in §101 is deferred to evaluation under §§102 and 103, the requirement of statutory subject matter from §101 is satisfied by anything that falls

broadly within its four recited categories, while the requirement of being “useful” under §101 is satisfied by anything that demonstrates a modicum of a useful, concrete, and tangible result.

Precedential case law has identified specific examples of subject matter outside of the bounds of patentability. The Supreme Court identified three categories of subject matter that are necessarily incompatible with the four recited categories of patentable subject matter from §101, namely, laws of nature, physical or natural phenomena, and abstract ideas. *Diamond v. Chakrabarty*. In *In re Warmerdam*, the Court of Appeals for the Federal Circuit identified mathematical constructs and their manipulation within the realm of abstract ideas, rather than constituting a patentable process. *In re Warmerdam*, 31 USPQ2d 1754, 1759 (Fed. Cir. 1994).

It is worth noting that the holding of *Warmerdam* was very specific to the facts of the claims at hand. The central holding of the *Warmerdam* court was a rejection of claims 1-4 of the patent application at issue, because they recited no more than the steps of “‘locating’ a medial axis, and ‘creating’ a bubble heirarchy”, which was determined to constitute nothing more than the manipulation of abstract ideas. *Warmerdam* at 1759. Immediately before this holding, the *Warmerdam* court asserted that the dispositive issue was whether the claims were directed to a process that goes beyond simple manipulation of abstract ideas, noting in Footnote 5 that this idea is sometimes interpreted in terms of “transformation of... ‘subject matter’” in which such “‘subject matter’ is not limited to tangible articles or objects, but includes intangible subject matter, such as data or signals, representative of or constituting physical activity or objects.” *Warmerdam*, footnote 5, at 1759 (citation omitted).

The second point that cannot be ignored with respect to the specific facts of *Warmerdam* is that the Court of Appeals for the Federal Circuit overruled the Board of Patent Appeals and Interferences with respect to their rejection of claim 5 of the application under §112, ¶2, rooted in the §101 rejection of claims 1-4. Claim 5 was directed to “A machine having a memory which contains data representing a bubble hierarchy generated by the method of any of Claims 1 through 4.” The Board rejected claim 5 under the assertion that it was unclear how a memory would be produced by the steps recited in any of claims 1 through 4. However, the Court found that claim 5 “is clearly patentable subject matter”. *Warmerdam* at 1759. It made that assertion as a conclusory statement to introduce its discussion of claim 5, prior to any further consideration of the matter.

Therefore, even though claims 1 through 4 were rejected as non-patentable subject matter, a claim directed to a machine having a memory containing data representing a bubble hierarchy generated by a method of any of claims 1 through 4 was found to be “clearly patentable subject matter”. This distinction could not be due to which category of subject matter under §101 claim 5 was directed to, since there is no preference for one statutory category over another; there is instead only the potential for a “process” per se to encompass steps of mere abstract manipulation of ideas, outside the realm of a statutory “process”, whereas defining a “machine” necessarily imposes a more concrete nature to recited subject matter. Footnote 5 of *Warmerdam* aimed at this distinction, indicating that those processes that are patentable include those that involve the transformation of data or signals that constitute or are representative of physical activity or objects. Expressed in terms of a properly patentable process, therefore, an equivalent process-directed claim might have been given as “A process for providing an electronic memory which contains data representing a bubble hierarchy generated by the method of any of Claims 1 through 4.” Therefore, one limitation that would have narrowed the claims to within the boundaries of patentable subject matter would have been simply to add a final step of providing the results of the earlier steps as a machine-accessible memory, in a data storage device.

In other words, the defect in claims 1 through 4 in the first place was not that there was something inherently unpatentable about the data structure subject matter they dealt with, but rather that they were defined broadly enough that they could encompass the manipulation of abstract ideas – an overly broad scope that in claim 5 is cured, and the claimed subject matter brought entirely within the scope of patentable subject matter, by specifying that the data structure is recorded onto a physical memory of a machine. The limitation configures the subject matter of the claims into conformity with the subject matter requirements of §101 because data that is recorded onto an electronic memory is per se exclusive of a mere abstract idea; what might have persisted only as an abstract idea prior to that point, ceases to be merely so upon recodation in an electronic memory. At that point, considerations of usefulness and novelty might be taken up, but satisfaction of patentable subject matter has been fulfilled, as at the very least, a physical electronic memory has been transformed.

In other settings, the courts have noted that evaluating whether subject matter works a “transformation” of matter, is not an exclusive requirement, but rather represents only one

illustrative example of how the subject matter may produce a useful, concrete, and tangible result, and therefore be confirmed to be patentable. *AT&T Corp. v. Excel Communications, Inc.*, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999); see also MPEP 2106 (IV)(C)(2)(2). Specifically, in the words of the appellate court, a physical transformation is “merely one example of how a mathematical algorithm may bring about a useful application.” *AT&T* at 1452, emphasis added. Even a process directed largely to a mathematical algorithm may therefore be evaluated for qualification as statutory subject matter based on whether it provides a useful result, as opposed to a mere abstract idea. As noted above, the court in *AT&T* did in fact find the subject matter at hand to be useful, and to qualify as patentable subject matter. Distinguishing between patentable subject matter and mere abstract ideas is therefore tied together with the requirement for claimed subject matter to be useful; resolving a question of the latter may resolve interpretations of the former.

## 2. THE PRESENT CLAIMS CONSTITUTE STATUTORY SUBJECT MATTER UNDER §101

The present claims include independent claims 1, 22, 27 and 36. The claims include subject matter relating to providing classifiers for labeling data. These claims clearly provide a final result that is useful, concrete and tangible.

The classifiers obtained are explicitly representative of physical activity or objects – as detailed in the language of the claim itself, in the surrounding claims, repeatedly in the specification, and as well understood by persons of ordinary skill in the art. It is simply unthinkable that a person of ordinary skill in the art, as opposed to perhaps someone with absolutely no background in computer science, would interpret something like a “classifier” as an abstract idea as opposed to a specific, useful, concrete, tangible element, which may be embodied as an executable program or module, for example. In other words, the claims provide for the production of data representative of physical activity or objects, such as web classification in one illustrative embodiment, that has been usefully, concretely transformed, using instances and providing for otherwise improvements in training a machine learning classifier, such as may be instrumental in ascertaining a meaning of data, in one illustrative embodiment. The claims are replete with patentable subject matter.

The applicants provided a rich description of illustrative real-world examples of classifier training data in the specification such as web page classification, bilingual bootstrapping and

news article classification, for example. Applicants further submit that the claims and specification are of course to be read in light of the understanding of persons of ordinary skill in the art. Machine learning, classifiers, and data used for the training of classifiers, have not been conceived *ex nihilo* by the applicants, but carry a wealth of understanding among persons of ordinary skill in the art, including an understanding of the useful applications to which the subject matter of the present claims may be directed. The useful applications of machine learning and training classifiers as well understood by those skilled in the art may be sampled by referring to Introduction to Machine Learning by Professor Ethem Alpaydin, The MIT Press, 2004. Section 1.2 of the book provides “Examples of Machine Learning Applications”. It discusses using training data for classifiers for machine learning systems, and applications of the same. The applications it lists include: credit scoring; pattern recognition; optical character recognition; syntactic and semantic sequences; face recognition; medical diagnosis; speech recognition; and data compression, for example. Alpaydin, pp. 3-12. As another illustrative example, machine learning classifiers have been trained using electrical impulses in the human brain correlated to human thoughts and perceptions, as observed using functional magnetic resonance imaging (fMRI) of human brains to provide the training data for the classifier. See e.g. Sean M. Polyn, Vaidehi S. Natu, Jonathan D. Cohen, Kenneth A. Norman, "Category-Specific Cortical Activity Precedes Retrieval During Memory Search", Science, 23 December 2005: Vol. 310. no. 5756, pp. 1963-1966.

Machine learning is even applied to stock market analysis - the very field of technology of the claimed subject matter that the Court held to be patentable subject matter in the *State Street Bank* decision. (See e.g. Haiqin Yang, Laiwan Chan, Irwin King, “Support Vector Machine Regression for Volatile Stock Market Prediction”, in Hujun Yin, Nigel Allison, Richard Freeman, John Keane, Simon Hubbard (eds.), Intelligent Data Engineering and Automated Learning - IDEAL 2002: Third International Conference, Manchester, UK, August 12-14 Proceedings (Lecture Notes in Computer Science), (pp. 391-396), 2002.)

Machine learning, and using training data to train classifiers for machine learning systems, are widely known by persons skilled in the art, who would recognize the advantageous useful, concrete, tangible results that might be gained by benefit of applying the subject matter of the present claims to any of the known applications for training a machine learning classifier.

While the Office Action expresses concerns that the present claims may be mistaken for manipulating purely abstract ideas, the applicants submit that the language of the present claims, and the understanding of those in the art, both independently negate the possibility of such confusion. In particular, “ascertaining a meaning” as claimed appears to have described a practical application that has been ignored by the Office Action.

It is further submitted that the dependent claims share in the patentability of the subject matter of their parent claims, and if anything, add limitations that further delineate their status as patentable subject matter. As such, claims 1-9 and 11-36 define statutory processes and do not merely manipulate an abstract idea but instead produce useful, concrete and tangible results.

REJECTIONS UNDER 35 U.S.C. §112

Claims 1, 22, 27 and 36 were also rejected under 35 U.S.C. § 112, first paragraph. These claims have been amended and provide clear correlation with the specification, in particular with regard to FIG. 7 and its associated description. As such, these claims are believed to meet the requirements of 35 U.S.C. § 112. Withdrawal of this rejection is requested.

REJECTIONS UNDER 35 U.S.C. §§102 and 103

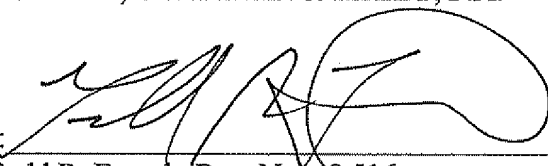
The Office Action further reports that claims 1-9, 11-13, 18-25 and 27-36 were rejected under 35 U.S.C. §102(a) as being anticipated by Lian et al., “Uncertainty Reduction in Collaborative Bootstrapping: Measuring and Algorithm” Additionally, claims 14-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lian and Gil (“Formalizing Spider Diagrams”) and claim 26 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Lian and Kokubo (U.S. Patent Application No. 2003/0144899). It is noted that the present inventors are authors of the Lian reference. A supplemental declaration under 37 C.F.R. 1.132 has been filed to establish that inventors Yunbo Cao and Hang Li are inventors in the Lian reference notwithstanding the authorship of the Lian reference. Thus, it is further requested that this rejection be withdrawn.

In view of the foregoing, Applicants submit that claims 1-9, 11-36 and 38 are in condition for allowance. As such, allowance of the present application is requested.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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